

LAWRENCE LIVERMORE REPORT

A weekly collection of scientific and technological achievements from Lawrence Livermore National Laboratory: June 9-June 16, 2008.

Sniffing out terrorist threats



Physicist Paul Steele (kneeling) and chemist Keith Coffee make adjustments to the LLNL detection instrument known as Single-Particle Aerosol Mass Spectrometry, or SPAMS.

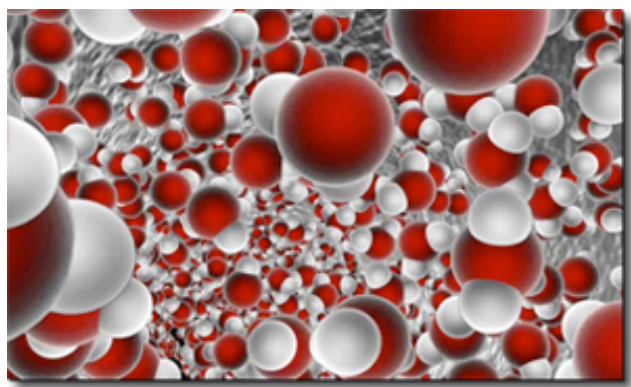
Security and law enforcement officials may some day have a new ally -- a universal detection system that can monitor the air for virtually all major threat agents that could be used by terrorists.

This type of system is under development by a team of Lawrence Livermore National Laboratory scientists and engineers, and has already been tested in laboratory and field experiments. In their latest advance, the team has conceptually shown that they can almost simultaneously detect four potential threat materials -- biological, chemical, explosives and radiological -- along with illicit drugs.

Their work, using a system called Single-Particle Aerosol Mass Spectrometry, or SPAMS, is described in the June 15 edition of *Analytical Chemistry*, a semi-monthly journal published by the American Chemical Society.

For more on SPAMS, including a video on how SPAMS works, see https://newsline.llnl.gov/articles/2008/jun/06.13.08_spam.php

Carbon nanotubes for molecular transport



A graphic representation of water flow through a rough pipe. Water through carbon nanotubes can travel much faster.

Molecular transport across cellular membranes is essential to many of life's processes, for example electrical signaling in nerves, muscles and synapses.

In biological systems, the membranes often contain a slippery inner surface with selective filter regions made up of specialized protein channels of sub-nanometer size. These pores regulate cellular traffic, allowing some of the smallest molecules in the world to traverse the membrane extremely quickly, while at the same time rejecting other small molecules and ions.

Using manmade carbon nanotube membranes, Lawrence Livermore researchers were able to mimic molecular transport and gain insight into the rejection mechanism within the pores. Their work appears in the *Proceedings of the National Academy of Sciences*.

For more on the research, including a video demonstration of molecular transport, see https://publicaffairs.llnl.gov/news/news_releases/2008/NR-08-06-03.html

LLNL's approach to strengthening competitiveness



An article entitled, "Strengthening Competitiveness, Lawrence Livermore is Moving Technologies to Market -- As Fast as It Can" is highlighted in the current issue of *Innovation, America's Journal of Technology Commercialization*. The article focuses on two principal Lawrence Livermore technology transfers. One is the licensing of advanced laser technology to a New Jersey company, Metal Improvement Company, which has treated more than 30,000 jet engine fan blades and more than 500 discs for hundreds of Boeing 777, Airbus A340, Gulfstream V and Bombardier regional jet planes.

The other effort featured is an agreement licensing a portable and accurate explosives detector to Largo, Fla.-based Field Forensics Inc. With an ELITE (Easy Livermore Inspection Test for Explosives) detector, border patrol agents, security agents, airport screeners and military personnel can determine within about 90 seconds whether explosives are present.

For more, see the article at <http://www.innovation-america.org/index.php?articleID=417>

Revolutionizing radiation detection



The fission meter

Sacramento television station KQVR recently reported how the war on terrorism is getting some "amazing hardware, thanks to Lawrence Livermore scientists."

"Whenever you travel these days you are being watched," reports John lander, "not just by human anti-terrorism personnel but increasingly now by little black boxes with amazing brains."

Because instrumentation once used to detect radiation was difficult to use and often imprecise, Lawrence Livermore scientists began combining a variety of detectors into one unit, for machinery that can better characterize radiation sources.

lander's report discusses how Lawrence Livermore researchers are making radiation detectors faster, cheaper and easier to use. For the report, go to https://publicaffairs.llnl.gov/news/llnl_reports/kovr_radiation_detect.mov

Livermore students receive Teller scholarships



Scholarship winners Meera Punjiya and Peter Wardell (center) were honored by Rep. Jerry McNerney (left) and Tracy Mayor Brent Ives.

Two Livermore high school students and two Tracy high school students have won the Lawrence Livermore National Laboratory's prestigious Edward Teller Science Scholarship. This year's award winners include Saqib Mohammad of Livermore High School, Grant Zhu of Granada High School, Meera Punjiya of Tracy High School and Peter Wardell of West High School.

The awards, instituted in 2004 in honor of the late Dr. Teller, renowned physicist and Lab co-founder, are given by the Laboratory to graduating seniors who excel in science studies. Each student will receive a \$1,500 scholarship toward a college education.

The students were honored Friday by Rep. Jerry McNerney. "These students deserve to be commended for their interest in and commitment to scientific pursuits," he said.

Mohammad was the lead programmer for the Livermore Robotics Team that took first place at the international Robofest competition. He hopes to study electrical and computer engineering at UCLA. Zhu also participated in the Tri-Valley Science & Engineering Fair in his junior year. He plans to attend UC Berkeley to study electrical engineering.

Punjiya, a dedicated student in science as well as science-related activities, will attend Harvey Mudd College. She has participated all four years as a member of Tracy High's Science Olympiad. Wardell will attend UCLA to study science or engineering. He is an outstanding student who graduated with honors from The Tracy Unified School District's Space and Engineering Academy.

Picture of the week



Proton power --- The view through a vacuum vessel window of a compact proton source under development by Lawrence Livermore's Beam Research Program. The development of the source is being undertaken in collaboration with Wisconsin-based TomoTherapy Inc. and the UC Davis Cancer Center to produce a compact proton therapy system for treating cancer patients. Proton therapy is considered the most advanced form of radiation therapy available, but size and cost have limited the technology's use to only six cancer centers nationwide.

LLNL is managed by Lawrence Livermore National Security, LLC, for the U.S. Department of Energy's National Nuclear Security Administration.

LLNL applies and advances science and technology to help ensure national security and global stability. Through multi-disciplinary research and development, with particular expertise in high-energy-density physics, laser science, high-performance computing and science/engineering at the nanometer/subpicosecond scale, LLNL innovations improve security, meet energy and environmental needs and strengthen U.S. economic competitiveness. The Laboratory also partners with other research institutions, universities and industry to bring the full weight of the nation's science and technology community to bear on solving problems of national importance.

To send input to the Livermore Lab Report, send e-mail <mailto:labreport@llnl.gov>.

The Livermore Report archive, including today's issue, is available at:
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